(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
1 February 2001 (01.02.2001)

PCT

(10) International Publication Number
WO 01/08055 A1

(51) International Patent Classification[7]: G06F 17/60, G06K 9/00, 19/07, G07F 19/00

(21) International Application Number: PCT/AU00/00880

(22) International Filing Date: 21 July 2000 (21.07.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PQ 1786 23 July 1999 (23.07.1999) AU
PQ 7029 20 April 2000 (20.04.2000) AU

(71) Applicant *(for all designated States except US)*: SECURECOM LTD [CN/CN]; Unit 3001, 30th Floor, 9 Queens Road, Central Hong Kong (CN).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: TAYLOR, Barry, John [AU/AU]; Level 3, 343 Little Collins Street, Melbourne, VIC 3000 (AU).

(74) Agent: PULLEN, Kevin, M.; P.O. Box 241, Landsborough, QLD 4550 (AU).

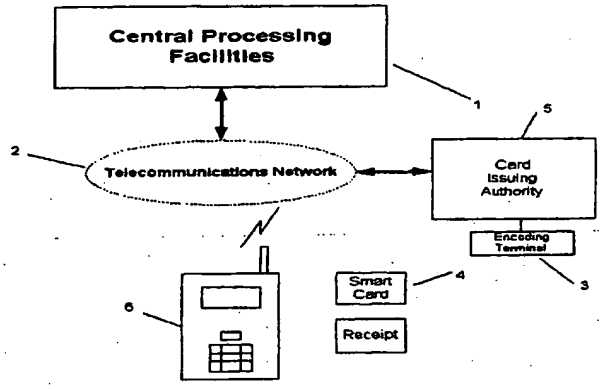
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SECURE TRANSACTION AND TERMINAL THEREFOR



(57) Abstract: A method and apparatus are disclosed for the positive identification of an individual of use for the secure purchasing of goods or services over a visual medium such as television, the Internet and EFTPOS systems. The apparatus is a point-of-sale terminal (6) which includes a keyboard (7), a screen (8), a fingerprint reader (9), a smart card reader assembly (10) and a printhead assembly incorporated within the card reader assembly (10). The operating software of the terminal (6) includes code to decrypt encrypted information read from the smart card (4). An individual wishing to undertake a secure financial transaction first obtains a smart card (4) which incorporates encrypted biometric data and financial data of that individual. At the point of intended purchase, the card (4) is placed in the reader assembly (10) of the terminal (6). The account details and encrypted biometric data are read by the terminal (6). The appropriate fingerprint of the individual is then taken at the fingerprint reader (9) of the terminal (6) from which the encryption key is determined. The encrypted fingerprint data read from the card (4) is then decrypted using the encryption key just determined and the thus-decoded fingerprint data from the card (4) is compared with the fingerprint data obtained at the terminal (6). If the thus-read fingerprint data is identical with that decoded from the card (4), identification is deemed positive and the financial transaction proceeds.

WO 01/08055 A1

TITLE: SECURE TRANSACTION AND TERMINAL THEREFOR

THIS INVENTION relates to the provision of a secure method for the positive identification of an individual, particularly as a means for the authentication of a purchase of goods or services or for cash withdrawals over a telecommunication medium. The invention finds particular, but not exclusive, use as a means for secure purchasing of goods or services over a visual medium such as television or other visual display medium or the Internet or as part of an EFTPOS system (electronic funds transfer at point of sale). However, the invention is not to be regarded as limited to such applications and includes within its scope the secure transfer of any data between two or more distanced stations.

The advertising of goods and services over media such as television and the Internet is now commonplace. With television advertising, the public can often purchase the goods or services so-advertised over the telephone using a credit card facility. With the Internet now well known as an electronic medium and powerful communications tool the seamless system (World Wide Web) linking information on different computers, the general public can readily access the Internet for a wide variety of purposes, including to order numerous consumer goods and/or services online. Once again, payment for these goods and/or services is often by a credit card facility. Yet again, payment of goods at their point of sale by credit or debit cards (EFTPOS) is now common in the marketplace.

A significant disadvantage of telecommunication purchasing is that it does not provide positive identification of individuals which is important for preventing unauthorized access to bank account or credit card details by a person wishing to purchase goods or services fraudulently.

Possibly the most common method of positive identification before a sale is authorized over a telecommunication medium is the use of a code specific for a particular account. These codes, often numeric but can be alphabetical or alphanumeric, are known as PIN numbers (Personal Identification Number) and are used in combination with the particular account number. However, as PIN and account numbers are not dependent on any cross-checking to ensure that they are being quoted over the telecommunication medium by the true proprietor of that PIN number and its associated credit card or bank account, this type of secure transaction is not too difficult to circumvent.

In particular, in current systems utilizing such a magnetic strip credit or debit card, both the user's account identification and PIN number are stored on the card. While this data is encoded, the card can be easily duplicated and then used fraudulently in at least two ways:

1. If the fraudulent user holds the card, a transaction can be completed, without a signature or PIN number, by several methods including over the telephone and the Internet using the card number, card name and expiry date.

2. If the fraudulent user knows the PIN number, then a substitute card can be used in ATM's, EFTPOS terminals, etc.

These fraudulent transactions create liability for both the issuing authority - which may be a bank building society or other financial institution - and the cardholder leading to subsequent disputes between the two parties.

One prior art solution proposed for this particular problem is to adopt methodologies relying on a physical attribute of the individual. Such methodologies, commonly referred to as biometric techniques, include

fingerprint analysis, thermograms and DNA analysis. These methodologies are considered less vulnerable to mistaken identity.

One such method includes comparing the biometric data on a card proffered by an individual to a previously created database of biometric data of authorized individuals. However, this system can still be foiled by individuals who have obtained a biometric card from its rightful owner. Alternatively, a fraudulent user of the card may partially duplicate the card, retaining any credit details but substituting his/her own biometric data for that of the rightful owner of the card. Further, the data obtained from the individual is usually compared to a vast remote databank of such information which is usually difficult and/or slow to locate and access.

The presently available methods to overcome the above discussed disadvantages thus are readily circumvented and do not provide satisfactory methods for the positive and expedient identification of an individual necessary to authentic a proposed financial transaction.

It is thus a general object of the present invention to overcome, or at least ameliorate, one or more of the above problems and/or disadvantages.

Therefore, according to a first aspect of the present invention, there is provided a method for a secure transfer of data over a telecommunication medium, said method including:

providing a transmission means to transmit said data from a person desirous of undertaking a transaction to a party requiring to verify said data in order to validate said data before said transaction can be undertaken; and

providing a validation means to ensure that said person is authorized to undertake said transaction, said validation means being unique for said person.

In a first embodiment of the present invention, said validation means includes biometric data of said person but, more preferably, includes only a part of said biometric data together with a date and time stamp.

In this first embodiment, when said validation means is transmitted as a code which has not been formulated in any conventional manner, any unauthorized user who intercepts that information only receives a coded form of the biometric data which cannot be used for a later, fraudulent, transaction.

In a second embodiment of the present invention, said validation means includes:

providing a unique description for said person, said unique description including biometric data and financial data of said person;

encrypting said unique description with an encryption key, said encryption key determined from said biometric data;

providing identification means adapted for carriage with said person, said identification means containing said unique description;

providing a reading means to obtain verification biometric data from an individual offering said identification means;

comparing said verification biometric data with said biometric data included in said unique description; and

authenticating said transfer of data if said verification biometric data from said individual is identical with said biometric data of said person included in said unique description.

Preferably, said encryption key is determined from only a part of said biometric data.

Preferably, said biometric data is a fingerprint analysis.

Preferably, said identification means is a card of the type capable of holding information in a machine-readable form.

Optionally, after said reading means has obtained said verification biometric data from said individual and said transfer of data has been initially authenticated, said verification biometric data is transmitted to a remote databank for further comparison with biometric data held in said databank.

Preferably, said person attends a point of issue for said identification means, such as a bank, where normal identification procedures for banking or credit card facilities must be met before said identification means is issued.

Preferably, said transmission means includes a terminal remote from said party whereby said person can supply said data to said party and which includes a cellular telephone or wireless data transmission link.

Thus, according to a second aspect of the present invention, there is provided a terminal for use in a method for a secure transfer of data as hereinbefore described, said terminal including:

transmission means to transmit identification details relevant to said person to said party; and

a facility for said person to provide verification biometric data of said person with said identification details.

Preferably, said transmission means further includes a credit or debit card slot assembly.

Preferably, said facility includes:

procuring means to obtain said verification biometric data from an individual offering said identification means;

reading means to read said identification means;

decoding means to obtain biometric data from said identification means;

comparison means to compare said biometric data with said verification biometric data; and

authentication means to authenticate said transfer of data.

Preferably, said procuring means is a fingerprint reader.

Preferably, said reading means is a smart card slot assembly wherein said smart card contains said biometric data.

More preferably, said reading means is, or is incorporated as part of, a computer, mobile telephone, EFTPOS terminal, ATM, or similar terminal.

In those embodiments where said reading means is incorporated into a mobile telephone, said identification means is preferably incorporated into the SIM card of the mobile telephone.

More preferably, said facility further includes a printout means to produce a hard copy for recording details of said transfer of data.

In a third embodiment of the present invention, said printout means is a printer either integral with, or separate from, said facility.

In a fourth embodiment of the present invention, said printout means is located within said smart card slot assembly. A print head assembly, which may be of a mechanical, thermal, laser or inkjet type, prints a receipt when the receipt is entered (or withdrawn) from the slot assembly subsequent to the completion of the transfer of data and removal of the smart card from the slot assembly. A sensor of either optical or magnetic type detects the presence of the inserted blank receipt and activates the printing process.

Preferably, said receipt is a single, duplicate or triplicate receipt in the form of a "tear off pad".

More preferably, said receipt is a multiple copy receipt of comparable size to a credit or debit card.

Most preferably, said receipt is in triplicate.

A preferred embodiment of the present invention will now be described with reference to the accompanying drawings, wherein:

FIG. 1 is a diagrammatic simplistic representation of all features of the present invention;

FIG. 2a is a top plan view schematic representation of the terminal of the present invention; and

FIG. 2b is a top edge view schematic representation of the terminal of FIG. 2a.

With reference to FIG. 1, there is a central processing unit (1) connected to a cellular telecommunications network (2). A fingerprint reader (3) is connected to a smart card (4) issuing terminal (5) which can communicate with the network (2). It will be appreciated by those skilled in the art that each of these components are known and their interconnection possible by any suitable means known in the art. A transaction terminal (6), placed at a merchant's place of business, is also in communication with the network (2). As illustrated in FIGS. 2a & b, the terminal (6) includes a keyboard (7) to enter details of a transaction, a screen (8) to display the thus-entered details, a fingerprint reader (9), a smart card reader assembly (10) and a printhead assembly (not illustrated) incorporated within the card reader assembly (10). The operating software of the terminal (6) includes code to decrypt encrypted information read from the smart card (4). Once again, it will be appreciated by those skilled in the art that each component of the terminal (6) is known and interconnection of the various components can be undertaken by known methods.

An individual wishing to undertake a secure financial transaction using a machine-readable card first obtains a card which incorporates encrypted biometric and financial data of that individual. This is achieved by presenting him- or herself to an institution such as a bank which issues machine-readable

"smart" cards. As is usual when applying for a credit or debit card at such an institution, the individual must first provide positive identification which meets the requirements of the institution before proceeding. Once assigned a smart card, biometric data, in particular, fingerprint data, of the individual is taken at the institution using any suitable fingerprint reader known in the art. Although not essential, data can be taken from two fingerprints to minimize any subsequent false rejection that may occur when the present invention is in use at a merchant's place of business. The scanned image of the fingerprint(s), which is represented by a mathematical representation of the ridge pattern, is then compressed and encrypted using any appropriate encryption algorithm known in the art of financial transactions to ensure that it can only be read or compared by first decrypting the data. This encrypted biometric data and the financial details of the individual are stored in the memory of the smart card.

To undertake a secure purchase using this card (4), at the point of intended purchase, the card (4) is placed in the reader assembly (10) of the terminal (6) whereby the value of the transaction is enter by the merchant using the keyboard (7). The value of the purchase is displayed on the visual display screen (8). The account details and encrypted biometric data are also read by the terminal (6). The appropriate fingerprint of the individual is then taken at the fingerprint reader (9) of the terminal (6) from which the encryption key is determined. The encrypted fingerprint data read from the card (4) is then decrypted using the encryption key just determined and the thus-decoded fingerprint data from the card (4) is compared with the fingerprint data obtained at the terminal (6); if the thus-read fingerprint data is identical with that decoded from the card (4), identification is deemed positive and the financial transaction proceeds. If the comparison is deemed negative, the customer re-presents the finger, or alternative finger if two such fingerprints have been stored on the card (4), for a second scan whereby the comparison process described above is repeated. Although this procedure could be repeated

several times, in practice, it is expected that the terminal (6) will be set to allow only a maximum of three consecutive attempts to obtain the verification biometric data and compare with the biometric data included within the smart card (4). If validation does not occur within those three attempts, the identification is deemed negative.

Upon a positive transaction, a receipt is inserted in the reader/printer slot (10) and the details of the transaction are recorded on the receipt. Details of the transaction are also transmitted to the central processing facilities (1) for record purposes.

Although in no way limiting, the method and terminal of the present invention are particularly suitable for point of sale purchasing of goods or services in all markets. The terminal can be a self-contained stand-alone unit, or used in cooperation with a palmtop, laptop or desktop computer or any other unit which includes a visual display unit.

Further, the terminal of the present invention can utilise any convenient telecommunication network, and can be any combination of cellular, satellite, microwave or hard wire telephone or other communication network although, preferably, the terminal will be a wireless communication device incorporating the functionality and convenience of a mobile cellular telephone.

Also, the secure transfer features of the present invention can be attached to existing ATM machines (Automatic Teller Machines) thus increasing the security of withdrawals therefrom.

By using the present invention, a number of advantages are obtainable including:

As authentication of a proposed financial transaction can be undertaken without accessing a remote database, this authentication can be undertaken quickly and in significantly less time than the 20 to 30 seconds required by present means where a central database has to be accessed.

Fraudulent use of a credit or debit card can be eliminated. Although a partial duplicate of smart card data can be made keeping the credit data, replacing biometric data of the true owner of the card with that of the fraudulent user is insufficient to create a valid card as the enoryption key is different being based on the original biometric data.

It will be appreciated that the above described embodiments are only exemplification of the various aspects of the present invention and that modifications and alterations can be made thereto without departing from the inventive concept as defined in the following claims.

CLAIMS

1. A method for a secure transfer of data over a telecommunication medium, said method including:

providing a transmission means to transmit said data from a person desirous of undertaking a transaction to a party requiring to verify said data in order to validate said data before said transaction can be undertaken; and

providing a validation means to ensure that said person is authorized to undertake said transaction, said validation means being unique for said person.

2. A method as defined in Claim 1, wherein said validation means includes biometric data of said person.

3. A method as defined in Claim 2, wherein said validation means includes only a part of said biometric data together with a date and time stamp.

4. A method as defined in Claim 1, wherein said validation means includes:

providing a unique description for said person, said unique description including biometric data and financial data of said person;

encrypting said unique description with an encryption key, said encryption key determined from said biometric data;

providing identification means adapted for carriage with said person, said identification means containing said unique description;

providing a reading means to obtain verification biometric data from an individual offering said identification means;

comparing said verification biometric data with said biometric data included in said unique description; and

authenticating said transfer of data if said verification biometric data from said individual is identical with said biometric data of said person included in said unique description.

5. A method as defined in Claim 4, wherein said encryption key is determined from only a part of said biometric data.

6. A method as defined in any one of Claims 2 to 5, wherein said biometric data is a fingerprint analysis.

7. A method as defined in any one of Claims 4 to 6, wherein said identification means is a card of the type capable of holding information in a machine-readable form.

8. A method as defined in any one of Claims 4 to 7, wherein after said reading means has obtained said verification biometric data from said individual and said transfer of data has been initially authenticated, said verification biometric data is transmitted to a remote databank for further comparison with biometric data held in said databank.

9. A method as defined in any one of Claims 1 to 8, wherein said transmission means includes a terminal remote from said party whereby said person can supply said data to said party and which includes a cellular telephone or wireless data transmission link.

10. A terminal for use in a method for a secure transfer of data as defined in any one of Claims 1 to 9, said terminal including:

transmission means to transmit identification details relevant to said person to said party; and

a facility for said person to provide verification biometric data of said person with said identification details.

11. A terminal as defined in Claim 10, wherein said transmission means further includes a credit or debit card slot assembly.

12. A terminal as defined in Claim 10 or Clam 11, wherein said facility includes:

procuring means to obtain said verification biometric data from an individual offering said identification means;

reading means to read said identification means;

decoding means to obtain biometric data from said identification means;

comparison means to compare said biometric data with said verification biometric data; and

authentication means to authenticate said transfer of data.

13. A terminal as defined in Claim 12, wherein said procuring means is a fingerprint reader.

14. A terminal as defined in Claim 12 or Claim 13, wherein said reading means is a slot assembly for a smart card wherein said smart card contains said biometric data.

15. A terminal as defined in any one of Claims 12 to 14, wherein said reading means is, or is incorporated as part of, a computer, mobile telephone, EFTPOS terminal, ATM, or similar terminal.

16. A terminal as defined in Claim 15 wherein said reading means is, or is incorporated as part of, a mobile telephone.

17. A terminal as defined in Claim 16, wherein said identification means is incorporated into the SIM card of said mobile telephone.

18. A terminal as defined in any one of Claims 10 to 17, wherein said facility further includes a printout means to produce a hard copy for recording details of said transfer of data.

19. A terminal as defined in Claim 18, wherein said printout means is a printer either integral with, or separate from, said facility.

20. A terminal as defined in Claim 18 or Claim 19, wherein said printout means is located within said slot assembly for said smart card.

Figure 1.

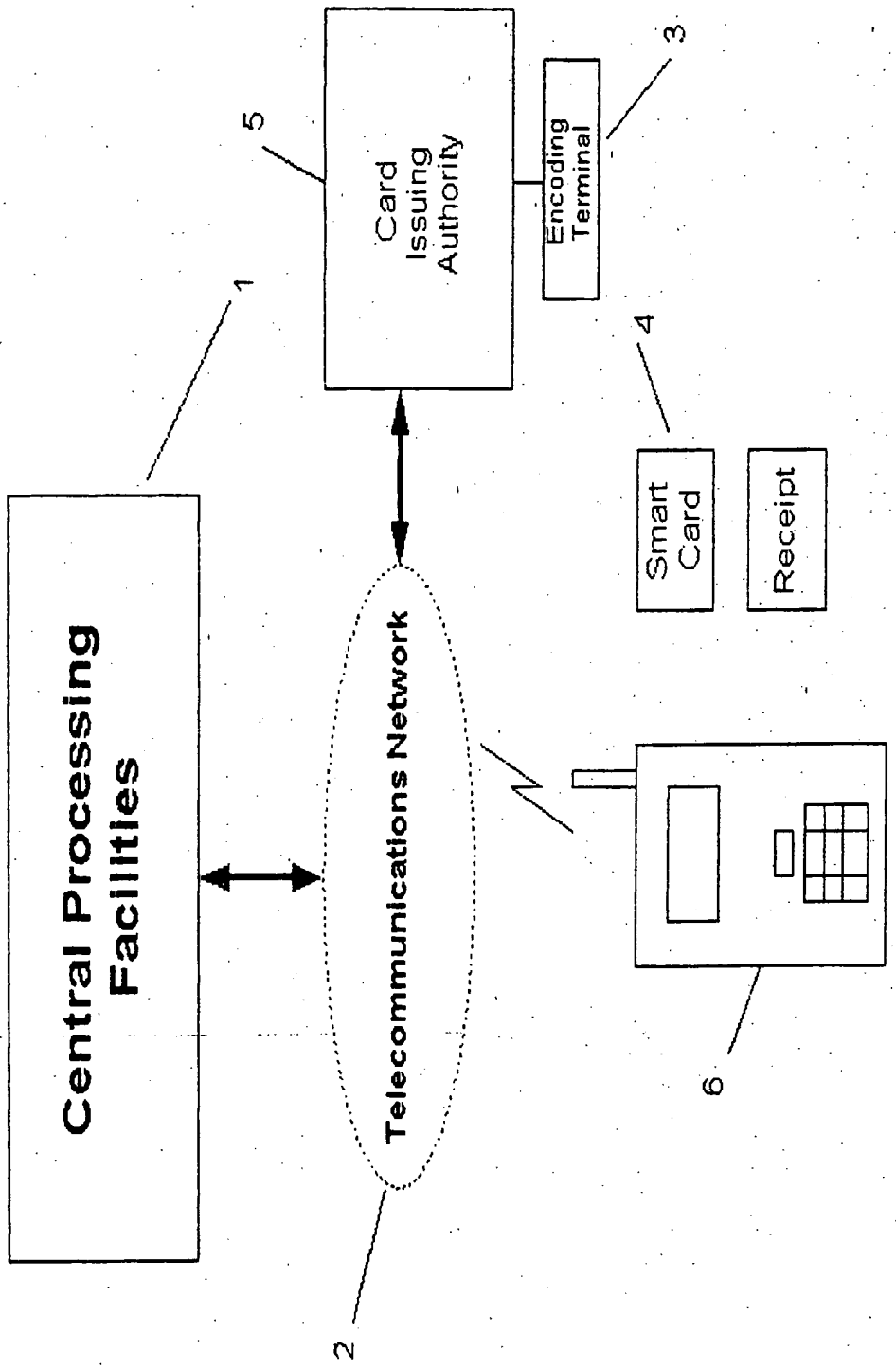

Central Processing Facilities
1
Telecommunications Network
2
Encoding Terminal
3
Smart Card
Receipt
4
Card Issuing Authority
5
6

Figure 2.

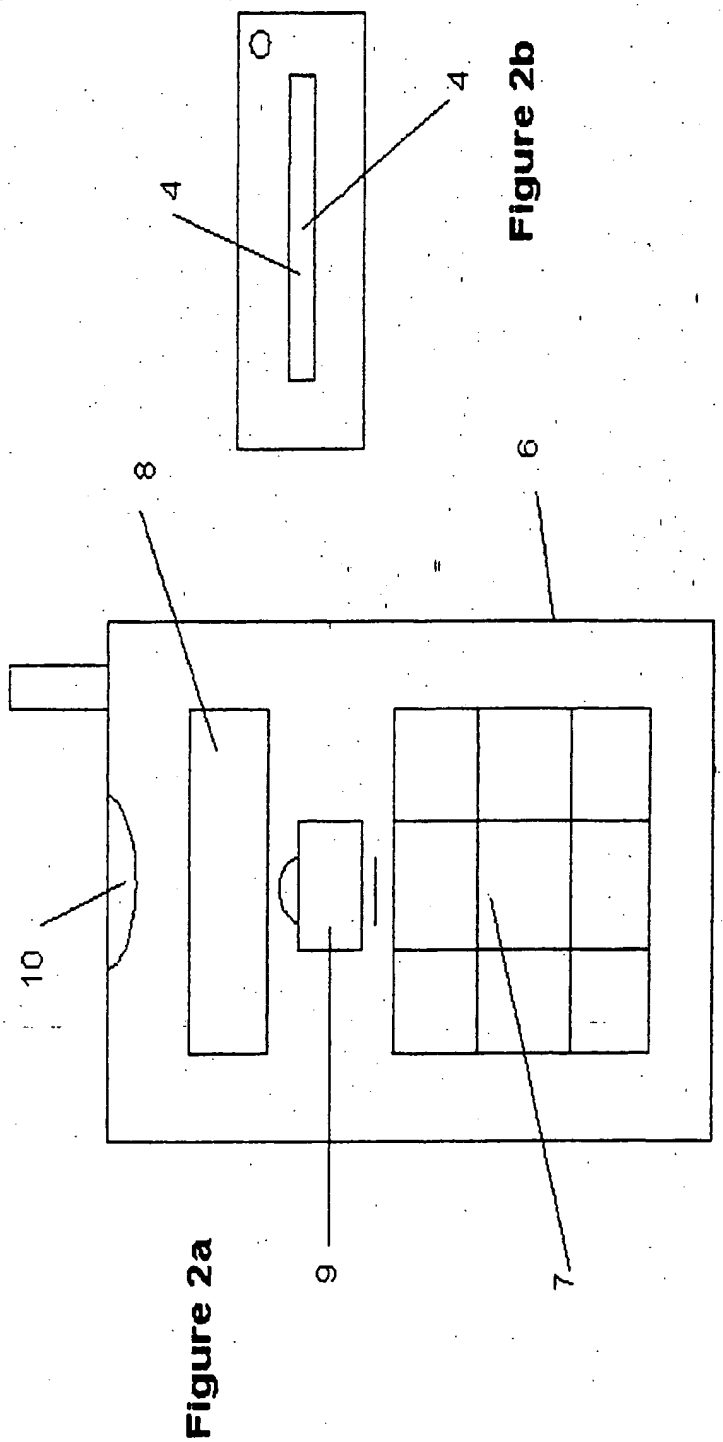


Figure 2b

Figure 2a

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU00/00880

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: G06F 17/60; G06K 9/00, 19/07; G07F 19/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC G06F, G06K, G07F 19/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU: IPC AS ABOVE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPAT,USPTO

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5870723A, PARE, Jr et al, 9 February 1999	1-3
X	EP 924655A, TRW INC, 23 June 1999	1-3
X	WO 9801820A, DYNAMIC DATA SYSTEMS PTY LTD, 15 January 1998	1-3

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 September 2000	21 SEP 2000

Name and mailing address of the ISA/AU	Authorized officer
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	S KAUL Telephone No : (02) 6283 2182

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU00/00880

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5764789A, PARE, Jr et al, 9 June 1998	1-3
X	US 5832464A, HOUVENER, 3 November 1998	1-3
A	WO 9106920A, TMS INCORPORATED, 16 May 1991	

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU00/00880

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
EP	924655	JP	11280317				
WO	9801820	AU	32489/97				
US	5870723	US	5615277	US	5613012	US	5764789
		US	5802199	US	5805719	US	5838812
		US	5870723	US	6012039	AU	59226/96
		CA	2221321	CN	1191027	EP	912959
		WO	9636934	AU	43295/97	WO	9809227
		AU	48023/97	WO	9815924		
US	5764789	US	5615277	US	5613012	US	5802199
		US	5805719	US	5838812	US	5870723
		US	6012039	AU	59226/96	CA	2221321
		EP	912959	WO	9636934	AU	48023/97
		WO	9815924	AU	65624/98	WO	9841947
US	5832464	AU	56771/96	CA	2220414	CN	1183186
		US	5657389	WO	9636148	US	5790674
		US	5832464	US	6040783	US	6070141
		AU	48379/99	WO	0007152		
WO	9106920	AU	67230/90	US	5363453		

END OF ANNEX